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applying a sufficient amount of steam in a steam treatment onto the entire width of the paper web in the drying section such that tensions that have been formed or that tend to be formed in the fiber mesh are relaxed by means of heat and moisture from the steam in the area of their formation or thereafter,

applying said steam treatment to an open face of the paper web as it runs on a suction sector of a suction roll or cylinder located at an end of said drying section, and

promoting the penetration of said steam treatment into the paper web in a direction of the thickness of the paper web by means of suction present on said suction sector.

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#### REMARKS

Reconsideration of the present application, as amended, is respectfully requested.

#### Rejection for Formal Matters

In the Office Action dated September 25, 1992, the Examiner rejected claims 1-8 under 35 U.S.C. §112, second paragraph, the Examiner stating that the recitation in claim 1 of a twin wire draw and/or single wire draw were not equivalent and rendered the claims indefinite. The Examiner further stated that in claim 7 there was no antecedent basis for the terms upper and lower rows.

In response to the Examiner's rejection, claim 7 has been amended to recite the steps of "arranging said drying cylinders in an upper row" and "arranging said suction roll or cylinder in a lower roll". Thus, antecedent basis has been provided for the terms "upper row" and "lower row". Further, the phrase "twin-wire draw and/or single-wire draw" has been removed from claim 1.

However, the Examiner's attention is respectfully directed to the fact that independent claim 8 did not contain the clause relating to a "twin-wire draw and/or a single-wire draw" and thus was not indefinite in this regard.

In view of the changes made to the claims and the arguments presented above, it is respectfully submitted that the Examiner's rejection under 35 U.S.C. §112 has been overcome and should be removed.

**Rejection Based On the Merits**

In the Office Action the Examiner rejected claims 1, 2 and 8 under 35 U.S.C. §102(b) as being clearly anticipated by Skaugen. In a phone conversation with the Examiner, the Examiner indicated that claim 6 was rejected on the same basis as claims 1, 2 and 8 while claims 3-5 and 7 were allowable if amended to overcome the rejections under 35 U.S.C. §112 and placed in independent form.

In response to the Examiner's rejection with respect to method claims 1, 2 and 6, the subject matter of claims 2 and 4 has been combined into independent claim 1. Claims 2 and 4 have been cancelled. As the Examiner indicated that such a combination would patentably define over the prior art of record, it is respectfully submitted that amended claim 1 and dependent claims 3, 5-7, which now depend on amended claim 1, patentably define over the cited Skaugen reference.

Independent claim 18 has been added directed to the embodiment described in claim 7 when combined with independent claim 1. Claims 19-21 set forth additional features of the embodiment of claim 18 similar to the subject matter of claims 3-5. Moreover, new independent claim 22 is a combination of claims 1, 2 and 3, a combination which the Examiner indicated was allowable. It is respectfully submitted that these claims are patentable over the Skaugen reference for similar reasons. In particular, with respect to new claim 18, it is respectfully submitted that the steam box 57 in Skaugen is applied against a suction roll 56 whereas claim 18 recites the application of the steam treatment in "free draws" in areas where the paper web runs between an upper row of drying cylinders and a lower row having a suction roll, and not against a

suction roll. This embodiment is illustrated in Fig. 3 wherein the steam boxes are denoted by reference numerals 30C and 30D.

In view of the changes made to claim 1 and the arguments presented above, it is respectfully submitted that the Examiner's rejection of method claims 1, 2 and 6 has been overcome and should be removed.

With respect to the rejection of independent apparatus claim 8, this rejection will be discussed in conjunction with the Examiner's rejection of claims 8-14 under 35 U.S.C. §103 as being unpatentable over Skaugen. In this regard, the Examiner stated that Skaugen discloses the invention substantially as claimed with the exception of steam regulation means and a showing of a single wire draw at the lead roller. The Examiner further stated that the use of means to regulate the application of steam to a web is "old in the arts and would have been obvious to have applied to Skaugen."

In response to the Examiner's rejections of claim 8 under 35 U.S.C. §102(b) and claims 8-14 under 35 U.S.C. §103, independent claim 8 has been amended to clarify features of the present invention. As now set forth in amended claim 8, the steam box is "arranged in said drying group" in the drying section of the paper machine. Moreover, the steam is applied in the steam treatment from the steam box "in the run of the paper web through the drying section such that a moisture profile in a direction of thickness of the paper web is controlled and the tendency of the paper web to curl is prevented in the run of the paper web through the drying section." Thus, it is clear that the steam box of the present invention is arranged in the drying section to obtain the advantages of controlling the moisture profile and preventing the tendency of the paper web to curl. Support for this feature is found in the specification on page 7, lines 22-29.

### Review of the Present Invention

Briefly reviewing the presently claimed invention, a method and apparatus for reducing the tendency of paper to curl in the drying section of a paper machine are disclosed herein. As set forth in claim 8, it is an important feature of the invention that hot steam is applied substantially onto the entire width of the paper web in the drying section whereby tensions that have been formed, or that tend to be formed, in the fiber mesh of the paper web as the paper web runs through the drying section are relaxed by means of heat and moisture in the area of their formation, or substantially immediately thereafter. Thus, the apparatus is directed to a solution for the tensions formed in the drying section as the web runs over the drying cylinders.

Some advantages achieved by the application of steam in the steam treatment in accordance with the present invention include the substantially uniform curling and moisture profile which prevent uneven tensions from arising in the web and also the relaxation of the tensions forming in the fiber mesh of the paper web. Other advantages are the control of the moisture profile in a direction of thickness of the paper web and the prevention of the tendency of the paper web to curl in the run of the paper web through the drying section.

These advantages are not hinted or suggested by the Skaugen references nor would one skilled in the art be motivated to alter the Skaugen references and place a suction box in the drying section of a paper machine.

### The Device of Skaugen

As illustrated in Figs. 1-4 of Skaugen, the closest approximation to a steam box is element 57 which is disposed adjacent to a press roll 56. The steam box 57 is arranged in the press section proper of the paper machine before the web is passed

into the drying section of the machine. Thus, Skaugen does not show the positioning and location of a steam box in the drying section of the paper machine. Steam box 57 is associated with suction roll 56 and permits heating of the web W (see column 5, lines 44-46) during the run of the web through the press section. It is clearly evident that suction roll 56 is not placed in the drying section, nor even close to the drying section which begins after transfer roll 68.

In contrast, as previously mentioned, the steam box of the presently claimed invention is placed in the drying section as set forth in claim 8.

Another significant difference between the steam box of Skaugen and the steam box in accordance with the presently claimed invention relates to the different function of the steam boxes in the two devices. The steam box of Skaugen is placed in the wire section or the press section to control the transverse moisture profile of the paper web in the wire section. For this reason, it is most appropriate to place the steam box in the wire section or the press section in order that the transverse moisture profile of the paper web is regulated within specific proportions. Skaugen does not hint or suggest changing the location of the steam box from being an integral part in the press section wherein the web is formed as it revolves around associated press rolls to the drying section of the paper machine.

In contrast to the present invention, there are no means provided in Skaugen to relax the tensions formed in the drying section of the paper machine around the drying cylinders or provide means for substantially uniform curling and moisture profiles. The steam box of the present invention is located "in the drying group" of drying cylinders in the drying section in order to reduce the tensions formed in the drying section as the paper web runs over the drying cylinders. By arranging the steam box in this location,

advantages of the presently claimed invention over the Skaugen reference are that the steam is applied via the steam box in such a manner to control the moisture profile in a direction of thickness of the paper web during the run of the web through the drying section with the added advantage that the tendency of the paper web to curl is prevented. These above-described features cannot be realized in the Skaugen reference wherein the steam box is arranged well before the drying section. In this regard, it is respectfully submitted that the tensions that form or tend to be formed in the drying section cannot be "pre-relaxed" by the application of steam before the drying section.

In view of the arguments presented above, it is respectfully submitted that one could not be motivated to change the location of the steam box of Skaugen to the drying section to obtain unexpected advantages of the arrangement of a steam box in the drying section such as those now set forth in independent claim 8. The completely different functions of the steam box of Skaugen and the steam box of the presently claimed invention preclude one skilled in the art from replacing the steam box of Skaugen into a position in the drying section. Furthermore, it is respectfully submitted that one would not be motivated without the improper use of hindsight to remove the steam box of Skaugen and locate it in the drying section..

In view of the arguments presented above, it is respectfully submitted that the Examiner's rejections of claim 8 under 35 U.S.C. §102(b) and claims 8-14 under 35 U.S.C. §103 have been overcome and should be removed.

In view of the actions taken and arguments presented, it is respectfully submitted that the present application is now in condition for allowance.

An Information Disclosure Statement listing references cited in a search report from a foreign patent office in a corresponding


application is submitted herewith, along with the required Official Filing fee of \$200.00.

A petition for a two-month extension of time for extending the time for response from December 25, 1992 to February 25, 1993 is enclosed herewith with the required fee of \$360.00.

An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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Enclosures:

Information Disclosure Statement (in duplicate)  
with fee of \$200.00  
References (10)  
PTO-1449 (2 pages)  
PTO-1083 (in duplicate)  
with fee of \$72.00  
Petition for an extension of time  
for two-months with fee of \$360.00